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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,244	12/01/2003	Shu-Hui Liu	NTCP0009USA	1243

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EXAMINER

LEVIN, NAUM B

ART UNIT PAPER NUMBER

2825

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/19/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/707,244

Applicant(s)

LIU ET AL.

Examiner

Naum B. Levin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/23/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to application 10/707,244 and Amendment filed on 10/16/2006. Claims 1-7 remain pending in the application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being unpatentable by Liebmann et al. (US Patent 7,001,693).

3. As to claim 1 Liebmann discloses:

(1) An optical proximity correction (OPC) method for correcting a photomask layout, wherein the photomask layout comprises at least a photomask pattern, the OPC method comprising:

collecting an assist feature bias of a predetermined first assist feature which will be added to the photomask layout (The flow chart shown in FIG. 4 is based upon a completely Rules-Based approach to designing a photolithographic mask in which primary mask feature biases ... are applied based on primary feature spacing directly from a rules table, which are illustrated by TABLE 1 above – col.12, ll.32-37 ... The SRAF rules table (TABLE 1) lists ... main feature biasing as a function of primary

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feature spacing - col.11, ll.10-13 ... the edge bias is lower 8.75 when TABLE I calls for more SRAFs, i.e. 2, 3 or 4 SRAFS whereas the edge bias is maximum 43.75 nm for 0 SRAFS with a spacing of 437.5 nm – col.11, ll.21-25) (col.8, ll.60-62; col.10, ll.60-67; col.11, ll.1-58; col.12, ll.30-37 ; col.12, ll.51-61);

performing a rule-based OPC process by taking account of the assist feature bias to compute a target bias of the photomask layout and output a corrected photomask layout according to the target bias (in step 104, the function is to apply bias to the circuit features for the mask as a function of main feature spacing according to the SRAF rules stored in tables 106 of SRAF rules (stored in the DSD) as indicated by line 107– col.12, ll.51-54, Fig. 4) (col.8, ll.45-48; col.12, ll.31-38; col.12, ll.51-62); and

adding the first assist feature to the corrected photomask layout (Then in step 108, the system applies SRAF elements (features) to the circuit features for the mask according to SRAF rules supplied to the system from the DSD as indicated by line 109 extending from the tables of SRAF rules 106 to step 108 - col.12, ll.63-67) (col.12, ll.63-67).

4. As to claims 2-7 Liebmann recites:

(2) The OPC method, wherein the first assist feature is a scattering bar (col.3, ll.44-51; col.12, ll.51-62);

(3) The OPC method further comprising using the collected assist feature bias to build an assist feature correction model for the rule-based OPC process (col.8, ll.45-48; col.12, ll.31-38; col.12, ll.51-67; col.13, ll.1-6; col.16, ll.21-53);

(4) The OPC method further comprising transferring the collected assist feature bias to a specific format for the ruled-based OPC process (col.7 ll.41-53; col.12, ll.9-12);

(5) The OPC, wherein the rule-based OPC process is used for correcting an edge portion of the photomask pattern (col.7 ll.41-53);

(6), (7) The OPC method, wherein the rule-based OPC process comprises collecting a width and a spacing and adding a second assist feature wherein the second assist feature is a serif pattern (col.8, ll.60-62; col.10, ll.60-67; col.11, ll.1-58; col.12, ll.30-37; col.12, ll.51-67; col.19, ll.35-51).

REMARKS

5. Mostly Applicant argues: "Liebman et al. never teach collecting an assist feature bias of an assist feature predetermined to add in the layout before executing the rule-based OPC."

Liebman, for example, teaches: "The flow chart shown in FIG. 4 is based upon a completely Rules-Based approach to designing a photolithographic mask in which primary mask feature biases ... are applied based on primary feature spacing directly from a rules table, which are illustrated by TABLE 1 above – col.12, ll.32-37 ... The SRAF rules table (TABLE 1) lists ... main feature biasing as a function of primary feature spacing - col.11, ll.10-13 ... the edge bias is lower 8.75 when TABLE I calls for more SRAFs, i.e. 2, 3 or 4 SRAFS whereas the edge bias is maximum 43.75 nm for 0 SRAFS with a spacing of 437.5 nm – col.11, ll.21-25". In other words Table 1/SRAF rules table collects assist feature bias that are predetermined in column 3 of the above

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table based on line width, spacing and number of SRAF elements. The SRAF rules table (TABLE 1) is created before rule based OPC as shown in Fig. 4.

6. Next Applicant argues: "Liebman et al. ... nor teach performing the rule-based OPC by taking account the collected assist feature bias ".

Liebman, for example, discloses: "in step 104, the function is to apply bias to the circuit features for the mask as a function of main feature spacing according to the SRAF rules stored in tables 106 of SRAF rules (stored in the DSD) as indicated by line 107— col.12, ll.51-54, Fig. 4".

7. Applicant also argues: "this application method comprises the step of directly adding the first assist feature into the outputted corrected photomask layout, while Liebmann et al. teach performing another OPC to check where has problem patterns in the layout for locally correcting".

Liebman, for example, recites: "Then in step 108, the system applies SRAF elements (features) to the circuit features for the mask according to SRAF rules supplied to the system from the DSD as indicated by line 109 extending from the tables of SRAF rules 106 to step 108 - col.12, ll.63-67". In other words Liebman add/applies in step 108 SRAF assist features into previously corrected and outputted in step 104 photomask layout.

8. Examiner defined Applicant's arguments as none persuasive.

9. Accordingly, **THIS ACTION IS MADE FINAL**. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Naum B. Levin whose telephone number is 571-272-1898. The examiner can normally be reached on M-F (8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on 571-272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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VUTHE SIEK
PRIMARY EXAMINER